

4.3

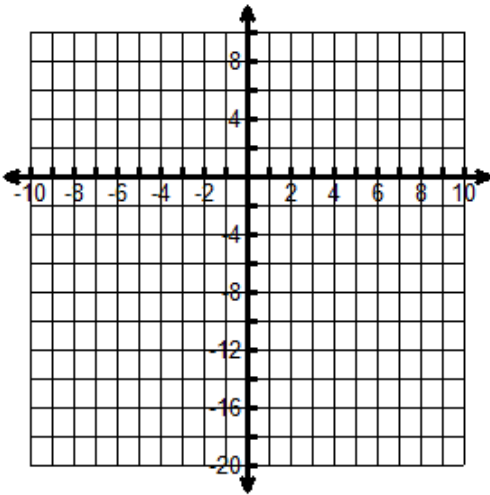
Key Features of Graphs

Name _____ Date _____ Period _____

Analyze the key features of each given function. Round all answers to the nearest hundredths.

- a. Graph the function, using technology
- b. Identify the intercepts (x and y)
- c. Identify the relative maximums and minimums
- d. Identify the intervals where the function is increasing, decreasing or constant
- e. Identify the intervals where the function is positive or negative
- f. Determine end behavior (write in limit notation)
- g. Determine symmetry odd, even or neither

1. $f(x) = x^3 + x^2 - 9x - 9$



a. see graph

b.

c.

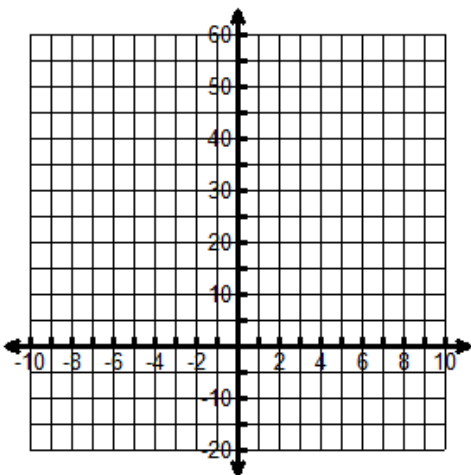
d.

e.

f.

g.

2. $f(x) = e^{x+4} - 3$



a. see graph

b.

c.

d.

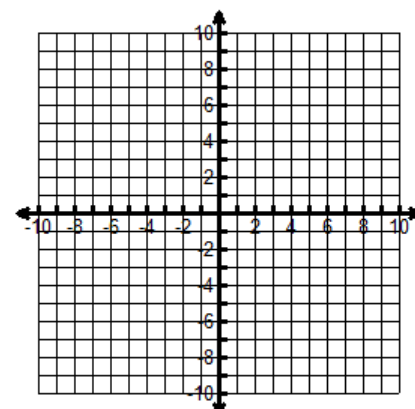
e.

f.

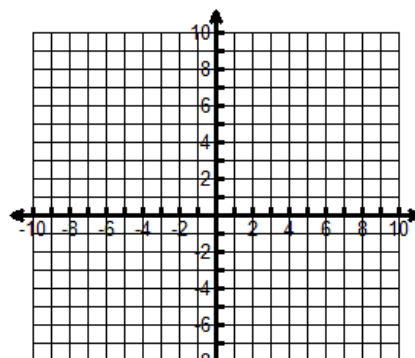
g.

Use the characteristics to sketch a graph of the function described.

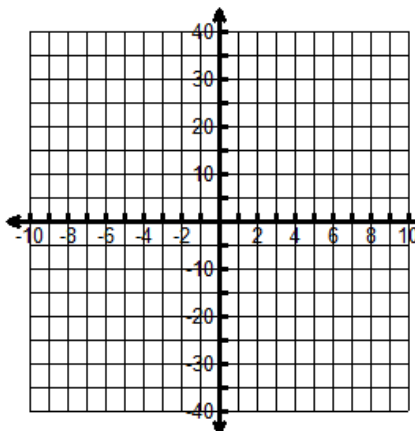
3. $f(x)$ is a function with intercepts at $(-1, 0)$ and $(0, 3)$, end behavior $\lim_{x \rightarrow -\infty} f(x) = -\infty$ and $\lim_{x \rightarrow \infty} f(x) = \infty$ and passes through the point $(3, 7)$.



4. $f(x)$ is an even function with a minimum at $(-2, -5)$, a maximum at $(0, 0)$, intercepts at $(-3, 0)$ and $(3, 0)$, and end behavior $\lim_{x \rightarrow \infty} f(x) = \infty$.



5. $f(x)$ is a function with intercepts at $(-5, 0)$, $(-2, 0)$, $(0, 0)$, $(2, 0)$ and $(4, 0)$, maximums at $(-4, 38)$ and $(1, 5)$, minimums at $(-1, -6)$, and $(3, -12)$, and end behavior $\lim_{x \rightarrow \infty} f(x) = \infty$ and $\lim_{x \rightarrow -\infty} f(x) = -\infty$.



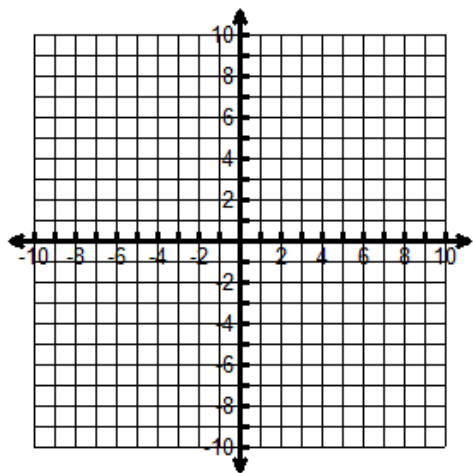
Graph $f(x)$ and each new function without technology on the same graph in different colors and label. Then describe the transformation compared to $f(x)$. Determine if the transformed function is even, odd, or neither. (You should have 4 graphs for each question.)

6. $f(x) = x$

a. $g(x) = -2f(x)$

b. $h(x) = f(x) + 2$

c. $j(x) = f(x - 3)$

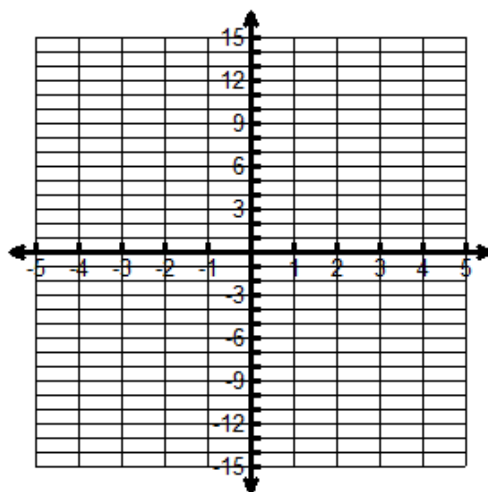


7. $f(x) = x^3$

a. $g(x) = -f(x)$

b. $h(x) = 3f(x) - 2$

c. $j(x) = f(x + 2)$

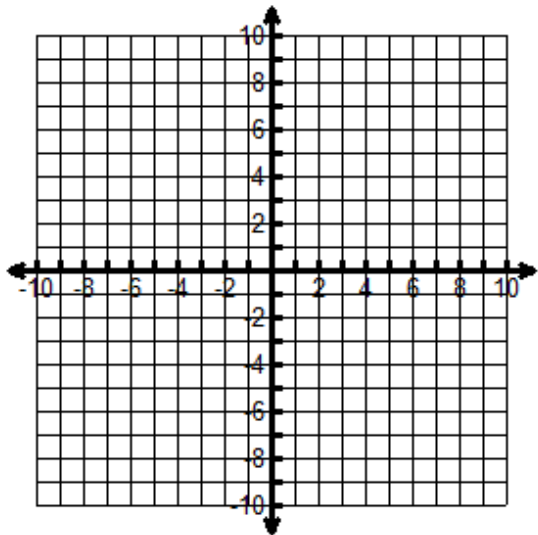


8. $f(x) = |x|$

a. $g(x) = 3f(x)$

b. $h(x) = f(x - 1) + 4$

c. $j(x) = 2f(x - 3) + 5$

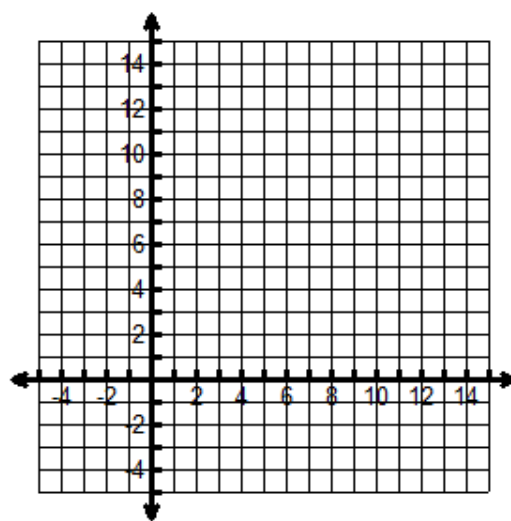


9. $f(x) = \sqrt{x}$

a. $g(x) = f(x + 1) - 3$

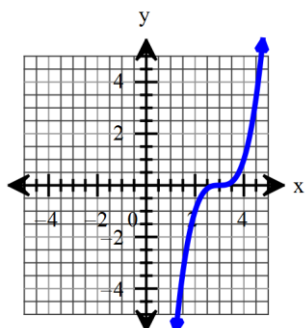
b. $h(x) = f(x) - 2$

c. $j(x) = 4f(x) + 1$

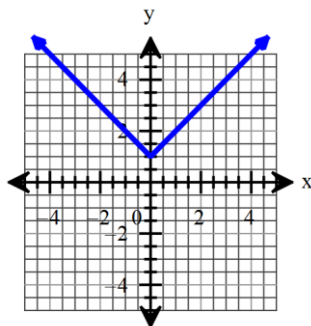


Each graph is a slight variation on the graph of one of the basic functions. Match the graph to one of the given functions $a - k$. All graphs are shown in the window $[-5, 5]$ $[-5, 5]$.

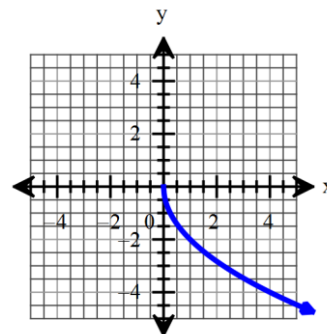
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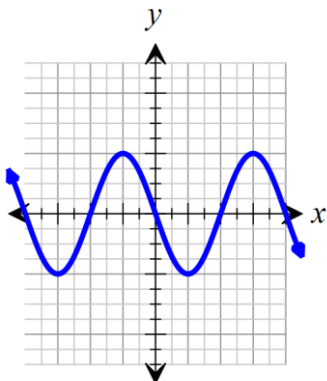
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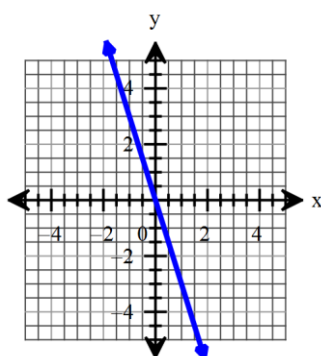
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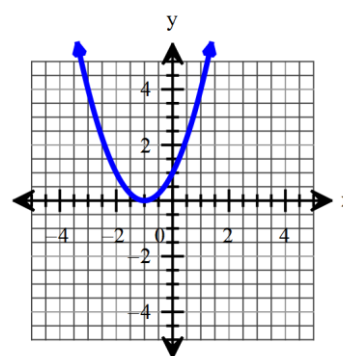
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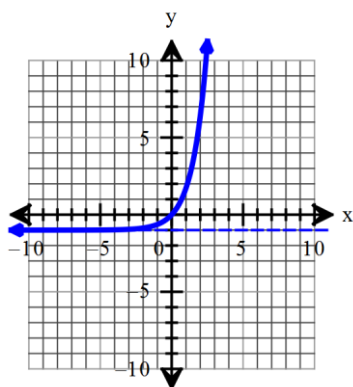
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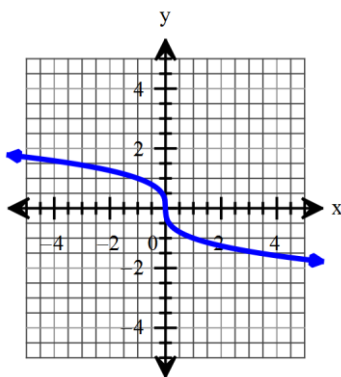
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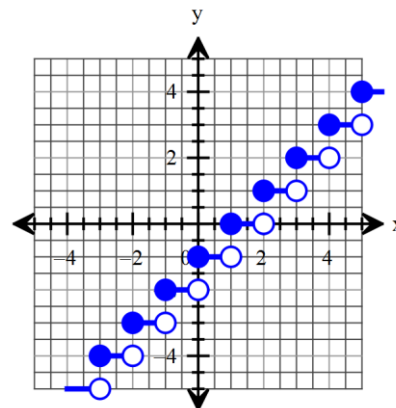
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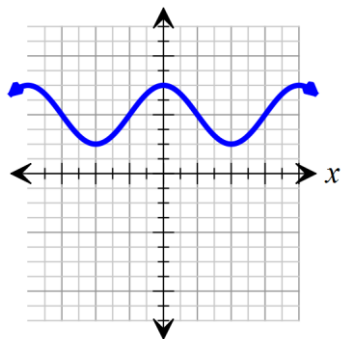
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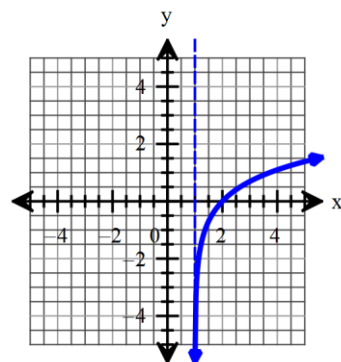
18.



19.



20.



a) $y = -2 \sin x$

b) $y = \cos x + 2$

c) $y = e^x - 1$

d) $y = (x - 3)^3$

e) $y = (x + 1)^2$

f) $y = |x| + 1$

g) $y = -3x$

h) $y = -2\sqrt{x}$

i) $y = \ln(x - 1)$

j) $y = -\sqrt[3]{x}$

k) $y = \ln(x - 1)$

Use the graphs from 10-20 and identify which of the graphs fit the description given.

21. The two functions whose domain consists of all nonnegative real numbers.
22. The function whose range is $[1, 3]$.
23. The five functions that have an x-intercept at zero.
24. The three functions that have a domain and range of all real numbers.
25. The three functions that are increasing on their entire domain.
26. The two functions with no zeros.

Use your graphing calculator to produce a graph of the function. Find the domain & range of the function by looking at the graph.

27. $f(x) = x^2 - 3$

domain:

range:

28. $f(x) = \ln(x + 2)$

domain:

range:

29. $f(x) = |x + 1|$

domain:

range:

30. $f(x) = 2\sqrt[3]{x}$

domain:

range:

For each of the following functions determine a) the interval on which the function is increasing and/or decreasing, b) if there are any extrema, if so name the point and tell whether it is a local maximum or minimum. Round to the nearest hundredths.

31. $f(x) = \sqrt{x - 6}$

increasing:

decreasing:

maximum or minimum:

32. $f(x) = \sin(x) + 2$

increasing:

decreasing:

maximum or minimum:

33. $f(x) = e^x - 1$

increasing:

decreasing:

maximum or minimum:

34. $f(x) = |x| - 4$

increasing:

decreasing:

maximum or minimum:

For each function below:

- Describe the transformations made from the parent function
- Then match each equation to the graph below

35. $f(x) = 2(x - 3)^2 + 5$

36. $f(x) = \sqrt{x - 7} + 2$

37. $f(x) = |x + 2| - 4$

38. $f(x) = -(x - 5)^2 + 3$

39. $f(x) = 2|-(x - 4)|$

40. $f(x) = 2|x - 4| + 2$

41. $f(x) = -\frac{1}{2}(x - 3)^2 + 5$

42. $f(x) = \sqrt{-x} - 1$

43. $f(x) = \sqrt{x + 7} + 2$

44. $f(x) = -\sqrt{x} + 1$

45. $f(x) = -|x - 4|$

46. $f(x) = (x + 5)^2 - 3$

